

# QUARTERLY REPORT

FOR JANUARY THROUGH MARCH 1995

OPERABLE UNIT 2  
IM/IRA SURFACE WATER  
FIELD TREATABILITY UNIT

PREPARED BY



ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE  
ENVIRONMENTAL RESTORATION PROGRAM DIVISION  
ENVIRONMENTAL OPERATIONS MANAGEMENT

April 27, 1995  
Page 1 of 14  
95-RF-03684

DOCUMENT CLASSIFICATION  
REVIEW WAIVER PER  
CLASSIFICATION OFFICE

---

## Table of Contents

	<u>Page</u>
1.0 Introduction . . . . .	3
2.0 Treatment Facility Performance . . . . .	3
2.1 Quantity of Water Treated . . . . .	3
2.2 Chemical Usage . . . . .	6
2.3 Waste Generation . . . . .	6
2.4 Operating Costs . . . . .	7
2.5 Power . . . . .	8
2.6 Preventative Maintenance . . . . .	8
2.7 Periods of Non-Collection . . . . .	9
3.0 Sampling . . . . .	9
3.1 Sampling Objectives . . . . .	9
3.2.1 Untreated Influent Water from SW59 . . . . .	9
3.2.2 Surface Water Location SW61 . . . . .	11
3.2.3 Surface Water Location SW132 . . . . .	11
3.3 RS-5 (Treated Effluent from Microfiltration (Prior to GAC)) . . . . .	12
3.4 RS-6 (Lead GAC effluent) . . . . .	12
3.5 RS-7 (Treated Effluent) . . . . .	12
3.6 RS-8 (Sludge) . . . . .	12
4.0 Operations Summary . . . . .	12
5.0 Environmental Compliance . . . . .	13
6.0 Reports/Correspondence . . . . .	13
7.0 Anticipated Operations for Next Quarter . . . . .	13
8.0 Summary/Conclusions . . . . .	14

---

**Quarterly Operations Report for January Through March 1995**  
**for the**  
**Operable Unit No. 2 IM/IRA Field Treatability Unit**

## **1.0 INTRODUCTION**

This report covers operations at the Operable Unit Number 2 (OU-2) Field Treatability Unit (FTU) for the first quarter of 1995.

The FTU initiated operations in accordance with the Interim Measure/Interim Remedial Action (IM/IRA) under the Plan released by the Department of Energy (DOE) on May 8, 1991. The FTU began operation as Phase I for treatment of surface water from a portion of the South Walnut Creek drainage at OU-2 for removal of volatile organic compounds (VOCs) of concern. The Phase I system consisted of collection facilities at Surface Water locations SW59 and SW61, equalization tankage, bag pre-filters, Granular Activated Carbon (GAC) treatment units and insulated, heat traced transfer piping, pumps, and controls. Phase I was conducted between May 13, 1991 and April 27, 1992, at which time the Radionuclides Removal System (RRS) and collection of SW132 was implemented under the Phase II program. The RRS added provisions for treatment of radionuclides and metals by pH adjustment, chemical precipitation and cross-flow membrane filtration. The RRS replaced bag pre-filters as pretreatment to the GAC system. Detailed descriptions of the FTU and its operation can be found in the IM/IRAP (Interim Measure/Interim Remedial Action Plan), the Sampling and Analysis Plan (SAP), and related documentation. The Field Treatability Study, Phase II (March 1994) for the South Walnut Creek Basin Surface Water Interim Measure/Interim Remedial Action report contains a detailed operating history of the FTU prior to this reporting period. The Environmental Protection Agency (EPA) and Colorado Department of Public Health and the Environment (CDPHE) authorized discontinuation of collection of two of the three surface water stations, SW61 and SW132 on April 24, 1994. Collection was discontinued on May 6, 1994.

## **2.0 TREATMENT FACILITY PERFORMANCE**

### **2.1 QUANTITY OF WATER TREATED**

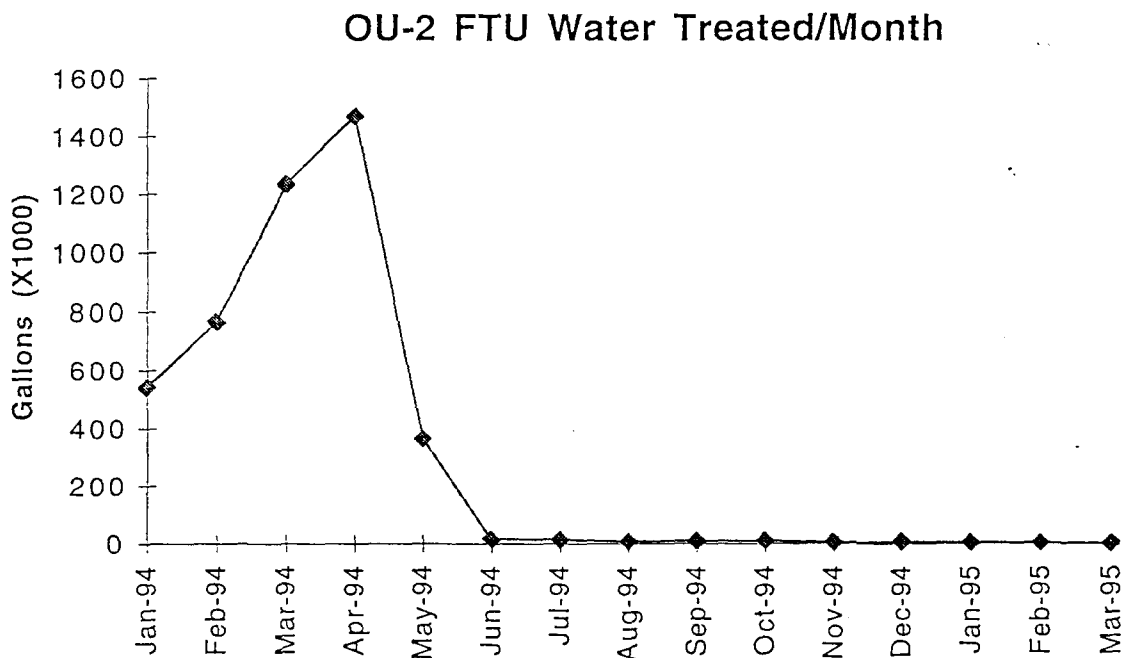
A total of 7,050 gallons of water were treated at the FTU during this reporting period.

The FTU was designed to collect surface water from three sources; SW59, SW61, and SW132. Collection occurs twenty four hours per day, 365 days per year, except for periods discussed in Section 2.7. Collected water is stored in a ten thousand gallon double walled equalization tank until enough water is present to justify initiating a batch treatment.

Collection of SW61 and SW132 was discontinued on May 6, 1994, after the EPA and CDPHE concurred with DOE's request to discontinue collection and treatment of these sources. While previous sampling has shown contamination at the two sites below Applicable or Relevant and Appropriate Requirement (ARAR) levels, the two sources will continue to be sampled to verify that no increase in contamination is present. Quarterly sample data for SW61 and SW132 will be presented in this report and future quarterly reports. Table 1 contains ARARs for the OU-2 FTU.

The significant reduction in the volume of treated water at the FTU is presented in Graph 1. Graph 1 also indicates the excess capacity available at the facility since collection and treatment of SW61 and SW132 is no longer required. The FTU is capable of treating 60 gallons per minute, continuously.

GRAPH 1



**TABLE 1**  
**Surface Water Contaminants**  
**Identified in the South Walnut Creek Basin IM/IRAP<sup>1,2</sup>**

<u>Analyte</u>	<u>Unit</u>	<u>ARAR</u>
<b>Radionuclides</b>		
Am-241	pCi/l	0.05
Gross alpha	pCi/l	11.00
Gross beta	pCi/l	19.00
PU-239/240	pCi/l	0.05
U-total	pCi/l	10.00
<b>VOCs<sup>3</sup></b>		
1,1-Dichloroethene	µg/l	7.00
Carbon Tetrachloride	µg/l	5.00
Chloroform	µg/l	1.00
Tetrachloroethene	µg/l	1.00
Trichloroethene	µg/l	5.00
Vinyl Chloride	µg/l	2.00
<b>Metals-Dissolved</b>		
Iron	µg/l	300.00
Manganese	µg/l	50.00
<b>Metals-Total</b>		
Aluminum	µg/l	200.00
Arsenic	µg/l	50.00
Barium	µg/l	1,000.
Beryllium	µg/l	100.00
Cadmium	µg/l	5.00
Chromium	µg/l	10.00
Copper	µg/l	25.00
Iron	µg/l	1,000.
Lead	µg/l	5.00
Manganese	µg/l	1,000.
Mercury	µg/l	0.20
Nickel	µg/l	40.00
Selenium	µg/l	10.00
Zinc	µg/l	50.00

<sup>1</sup> From the IM/IRAP (DOE, 1991).

<sup>2</sup> Only analytes with ARARs are presented.

<sup>3</sup> Analyzed by EPA Method 524.2.

- Not calculated in the IM/IRAP.

The volume of water collected for treatment during this reporting period was as follows:

<u>Month</u>	<u>Total Gallons</u>	<u>Gallons/Day</u>	<u>Gallons/Minute</u>
January	4,588*	148	0.10
February	2,000	71	0.05
March	2,050	66	0.05

\*The FTU received 1,978 gallons of water (for treatment) from the Environmental Restoration Decontamination Pads.

## 2.2 CHEMICAL USAGE

Chemical usage at the FTU was as follows:

<u>Month</u>	<u>Sulfuric Acid</u>	<u>Calcium Hydroxide</u>	<u>Ferric Sulfate</u>	<u>Hydrogen Peroxide</u>	<u>Sodium Hydroxide</u>
January	0 gal	0 lbs	0 lbs	0 gal	0 gal
February	0.5 gal	0 lbs	17.25 lbs	0 gal	55 gal
March	0 gal	0 lbs	0 lbs	0 gal	0 gal

Note: Several chemicals are recorded as 0 gallons or pounds due to the small volume of water processed. These chemicals were used at normal concentrations, but preparation of chemical solutions for treatment was not required during the month.

## 2.3 WASTE GENERATION

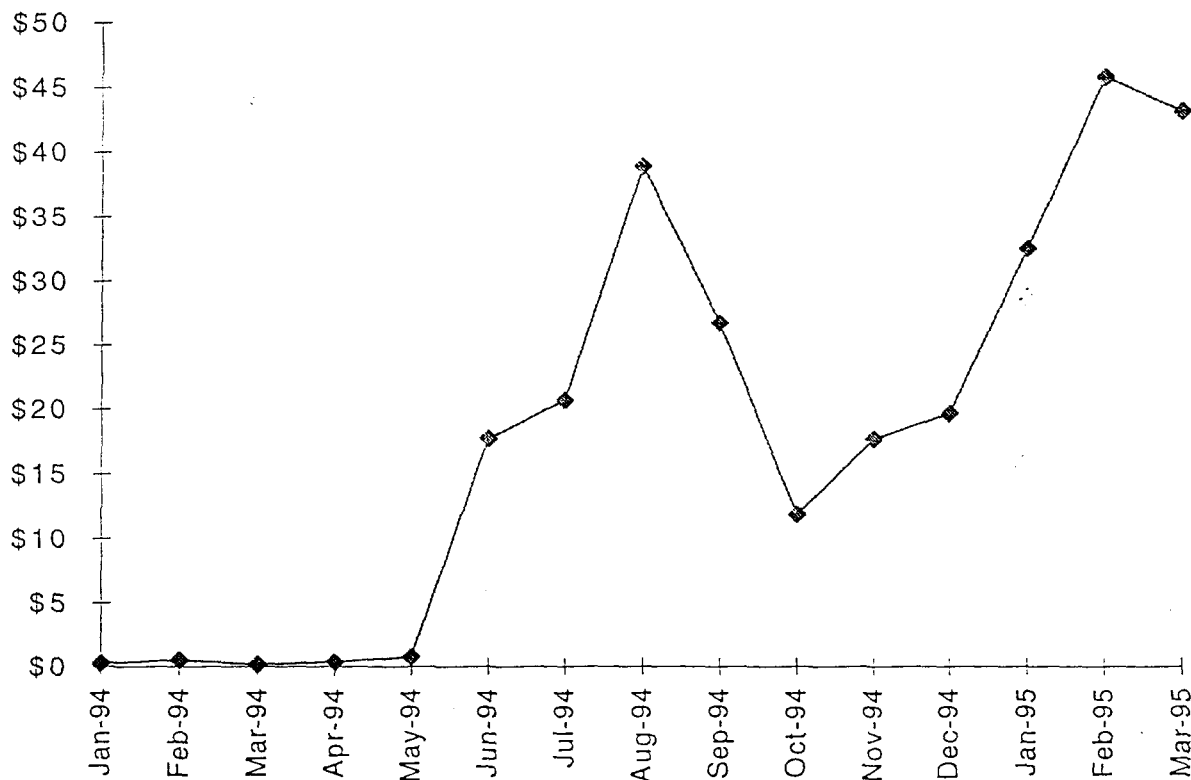
One 55-gallon drum of filtered sludge was packaged during this reporting period.

One 55-gallon bag of used Personnel Protective Equipment (PPE) was generated during this quarter. The PPE is monitored for contaminants, and if determined clean for unrestricted release, sent to the Rocky Flats Plant Landfill for disposal. To date, no PPE has been found to be contaminated.

## 2.4 OPERATING COSTS

The reduced volume of water that is collected and treated at the FTU has resulted in cost savings for sampling and chemical supplies. Modifications to reduce the subcontract started soon after collection and treatment of SW61 and SW132 was discontinued, and was fully implemented in early October, 1994. The cost/gallon of treated water at the FTU is presented in Graph 2, below. These costs include subcontract labor and operations costs, capital improvements (permanent power installation), Plant Support, mixed waste disposal (320 55-gallon drums), and Project Management. A significant increase in treatment costs/gallon of treated water can be attributed to the reduction in treated water, since the FTU is a large capacity facility.

GRAPH 2  
FTU \$/Gal for Treated Water



The large increase in treatment cost can be attributed to the reduction of SW61 and SW132. Operations at the FTU have been cut back as much as possible (manned operations have been reduced from 24 hour/day, 7 days/week, to a 40 hour week), however, the cost/gallon to treat water cannot be reduced to the higher volume treatment costs. Monitoring of the tanks and piping that contain the untreated water cannot be eliminated, and preventive maintenance must

be performed in order to keep the facility operational. Project Management has been reduced by approximately 80% to help reduce operations costs.

Monthly operating costs for *subcontractor labor and supplies* (including chemicals) were as follows:

January:	\$25,780
February:	\$22,425
March:	\$25,685

Total monthly operating costs (burdened support labor, subcontract costs, equipment, and sampling) for the FTU are presented below:

January:	\$246,638	(\$97,000 for disposal of sludge & filters)
February:	\$91,789	
March:	\$88,704	

The increased cost per gallon rate (only treating SW59) at the OU-2 FTU justifies treating the water in a different manner. EG&G Rocky Flats Inc. has proposed to consolidate the OU-2 FTU and OU-1's Building 891 water treatment facilities. Discontinuation of collection and treatment of the 881 Footing Drain has been approved, providing OU-1 with excess capacity and increased treatment costs similar to that of the FTU. By consolidating the two facilities, treatment costs will be reduced, and secondary waste production will be minimized. Any additional sources of water (non-RCRA) that can be treated at the new facility will help reduce the cost/gallon to treat the water. Consolidation of the two facilities is underway, with an estimated completion date of late July, 1995. Preliminary data indicates that the consolidated facility will reduce OU-1 and OU-2 water treatment costs by \$1.2 million per year, and allow for treatment of large volumes of environmental wastewaters at a minimal cost.

## 2.5 POWER

Permanent overhead power replaced diesel power generation on July 8, 1994.

Backup power is provided to the FTU from a portable diesel generator that is wired into the power grid through a transfer switch. In the event of a power failure, the diesel generator will provide 100% of the power required to operate the facility. The generator is listed on the RFETS Air Pollution Emission Notice, and is operated one (1) hour per week for preventive maintenance concerns.

## 2.6 PREVENTIVE MAINTENANCE

During this reporting period a rigorous preventive maintenance program monitored all process equipment at the FTU. A preventive maintenance computer program tracks all planned maintenance activities and helps to assure that all equipment is properly maintained.



## **2.7 PERIODS OF NON-COLLECTION**

Periods of non-collection are periods when the collection weir pumps cannot collect surface water (up to 60 gallons per minute) and transfer it to the equalization tank for storage and later treatment.

No periods of non-collection have occurred since collection of SW-61 and SW-132 was discontinued on May 6, 1994.

## **3.0 SAMPLING**

### **3.1 SAMPLING OBJECTIVES**

Sampling at the FTU is performed to characterize the influent surface water, wastes, and effluent water, and to optimize FTU operations to minimize chemical consumption and waste generation. The IM/IRA identified specific contaminants of concern and established possible chemical-specific ARARs as effluent standards for discharge of the treated water (ref. Table 1, page 5).

Sample results contained in this report are unvalidated, and are presented to provide a general scope of the contaminants treated at the facility. Additionally, radionuclide data turnaround time is significantly longer than that of VOC or metals. All available data for the reporting quarter is presented below.

Sample results showing contaminants exceeding ARARs for this quarter are presented below, as well as contaminants not associated with ARARs that are present in the water stream above detection levels. Sample data that was not presented in the last quarterly report (due to long turnaround times) for the FTU is also presented in this report.

Due to the decrease in the volume of collected and treated water, sampling at the FTU has been reduced significantly.

Surface Water Division continues to characterize the three sampling locations (SW59, SW61, and SW132) associated with the FTU. Analytical results for the three sources are presented in the OU-2 FTU Quarterly Operations Report.

#### **3.2.1 UNTREATED INFLUENT WATER FROM SW59**

##### **SW59 Radionuclides (October 1994 - February 1995)**

Data received from the seventeen samples taken at SW59 from October 1994 through early February 1995 indicate that plutonium-239/240 exceeded its ARAR of 0.05 pCi/l on three separate occasions, with values of  $0.095 \text{ pCi/l} \pm 0.016 \text{ pCi/l}$ ,  $0.13 \text{ pCi/l} \pm 0.018 \text{ pCi/l}$ , and  $0.14 \text{ pCi/l} \pm 0.021 \text{ pCi/l}$ .

The gross alpha ARAR of 11.00 pCi/l was exceeded on two separate occasions at SW59, with values of 19 pCi/l  $\pm$  4.3 pCi/l, and 31 pCi/l  $\pm$  5.3 pCi/l.

The gross beta ARAR of 19.00 pCi/l was exceeded on three separate occasions at SW59, with values of 34 pCi/l  $\pm$  1.8 pCi/l, 43 pCi/l  $\pm$  2 pCi/l, and 21 pCi/l  $\pm$  2.4 pCi/l.

**SW59 VOCs (November 1994 - February 1995)**

<u>Chemical</u>	<u>Units</u>	<u>High</u>	<u>Average</u> <sup>1</sup>	<u>ARAR</u>
1,1-Dichloroethane	ug/L	0.8	0.48	None
1,1-Dichloroethene	ug/L	1	0.65	7
1,1,1-Trichloroethane	ug/L	3	1.46	None
Carbon Tetrachloride	ug/L	70	33.4	5
Chloroform	ug/L	16	8.54	1
Methylene Chloride	ug/L	1	0.18	None
Tetrachloroethene	ug/L	24	11.7	1
Trichloroethene	ug/L	23	12.4	5
cis-1,2-Dichloroethene	ug/L	35	19.8	None
Vinyl Chloride	ug/L	8	1.71	2

<sup>1</sup> Average value calculated by taking all values (for non-detect, 1/2 the detection limit was used) and dividing by the number of samples.

**SW59 Metals (November 1994 - February 1995)**

<u>Metal</u>	<u>Units</u>	<u>High</u>	<u>Average</u> <sup>1</sup>	<u>ARAR</u>
Aluminum	ug/L	21,000	2,097	200
Iron	ug/L	12,100	One ARAR Exceedance	1,000
Lead	ug/L	23.2	One ARAR Exceedance	5
Manganese	ug/L	1,440	One ARAR Exceedance	1,000
Zinc	ug/L	746	316	50

### 3.2.2 SURFACE WATER LOCATION SW61

#### SW61 Radionuclides (October 1994 - February 1995)

Data received from the nineteen samples taken at SW61 from October 1994 through early February 1995 indicate that plutonium-239/240 exceeded its ARAR of 0.05 pCi/l on December 20, 1994, with a value of 0.095 pCi/l  $\pm$  0.018 pCi/l.

#### SW61 VOCs (November 1994 - February 1995)

Carbon Tetrachloride exceeded its associated ARAR of 5 ug/l once, with a value of 17.5 ug/l.

Chloroform exceeded its associated ARAR of 1 ug/l once, with a value of 2 ug/l.

Tetrachloroethene exceeded its associated ARAR of 1 ug/L once, with a value of 9 ug/l.

Trichloroethene exceeded its associated ARAR of 5 ug/l once, with a value of 7 ug/l.

#### SW61 Metals (November 1994 - February 1995)

<u>Metal</u>	<u>Units</u>	<u>High</u>	<u>Average</u> <sup>1</sup>	<u>ARAR</u>
Aluminum	ug/L	1710	392	200
Iron	ug/L	2060	660	1,000
Lead	ug/L	5.7	One ARAR Exceedance	5
Zinc	ug/L	191	104	50

<sup>1</sup> Average value calculated by taking all values (for non-detect, 1/2 the detection limit was used) and dividing by the number of samples.

### 3.2.3 SURFACE WATER LOCATION SW132

#### SW132 VOCs (November 1994 - February 1995)

Volatile Organic Compound data indicates no ARAR exceedences at sampling location SW132 between November 1994 and February 1995.

#### SW132 Radionuclides (October 1994 - February 1995)

Data received from the eighteen samples taken at SW132 from October 1994 through early February 1995 indicate that plutonium-239/240 exceeded its ARAR of 0.05 pCi/l on

December 20, 1994, with a value of  $0.078 \text{ pCi/l} \pm 0.016 \text{ pCi/l}$ .

**SW132 Metals (November 1994 - February 1995)**

Aluminum exceeded its ARAR of 200 ug/l once, with a value of 844 ug/l.

Iron exceeded its ARAR of 1,000 ug/l once, with a value of 1,380 ug/l.

Zinc exceeded its ARAR of 50 ug/l in eleven of the twelve samples taken from late November 1994 through early February 1995, with an average value of 93.8 ug/l.

**3.3 RS-5 (TREATED EFFLUENT FROM CHEMICAL  
PRECIPITATION/MICROFILTRATION PRIOR TO GAC)**

Due to the low volume of treated water, no samples were collected from this location.

**3.4 RS-6 (LEAD GAC EFFLUENT)**

Due to the low volume of treated water, no samples were collected from this location.

**3.5 RS-7 (TREATED EFFLUENT)**

No radionuclides, metals, or VOCs exceeded ARARs at RS-7 during this quarter.

**3.6 RS-8 (SLUDGE)**

One drum of sludge was packaged during this quarter, however, analytical data was not received prior to preparing this report.

**4.0 OPERATIONS SUMMARY**

Collection and treatment of SW-59 water continued without incident.

Sampling and characterization of SW-59, SW-61, and SW-132 continues.

The FTU accepted 1,978 gallons of water for treatment from the Environmental Restoration Decontamination Pads.

## 5.0 ENVIRONMENTAL COMPLIANCE

No spills or releases to the atmosphere, secondary containment, or environment occurred during this reporting period.

## 6.0 REPORTS/CORRESPONDENCE

During this reporting period no significant reports and/or documents that pertained to the OU-2 FTU were generated.

## 7.0 ANTICIPATED OPERATIONS FOR NEXT QUARTER

Normal operations are expected to continue next quarter, with no expected shutdowns or periods of non-collection.

Purge water collected from contaminated wells may be treated at the FTU. All purge water will be sampled to determine the best facility to treat the water. Possibilities for treatment include the OU-1 IM/IRA (Bldg. 891), OU-2 IM/IRA FTU, 374 Evaporator, and the Sewage Treatment Plant. Each facility is limited by certain contaminants, so sampling will determine the final destination.

Phase II spent GAC will be sent offsite for reactivation or disposal.

Offsite shipment of mixed waste sludge and filter socks generated during operation of the FTU will begin next quarter. The sludge will be shipped to Envirocare, a licensed mixed waste repository located in Utah.

Work will continue for consolidation of the OU-1 and OU-2 FTU water treatment facilities.

Sampling and characterization of SW59, SW61, and SW132 will continue.

A double walled storage tank will be installed adjacent to SW59 to allow for storage of water during periods when the site is unattended, and to allow for tanker transfer activities when SW59 is transferred to the consolidated treatment facility for treatment.

A modification to the OU-2 FTU Interim Measure/Interim Remedial Action Plan will be made in order to consolidate the OU-1 and OU-2 water treatment facilities.

Movement of the FTU chemical precipitation/microfiltration to OU-1 will commence next quarter if approved by the regulatory agencies in an effort to reduce treatment costs and expand RFETS water treatment capabilities.

## 8.0 SUMMARY/CONCLUSIONS

The OU-2 FTU continues to collect and treat contaminated surface water from SW59 24-hours per day, 365-days per year.

In order to reduce operating costs and provide additional treatment for most all environmental wastewaters, the OU-1 and OU-2 treatment equipment will be consolidated at Building 891. The design for this project is underway, with an expected project completion date of late July, 1995